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We may therefore conclude (1) that the temperature conditions governing the fauna of the Maryland Chesapeake were those of the temperate rather than the boreal or subtropical faunas of the present coast; and (2) that the temperature of the Chesapeake embayment was on the whole somewhat warmer than at present. This is what the genera represented also indicate. Between the several horizons of the Maryland Chesapeake there is but very slight indication of any temperature difference; so far as there is any, it points toward a progressive but slight cooling of the water from the Calvert to the St. Mary's; while the subsequent Pliocene was doubtless accompanied by a change in the opposite direction, a rise of temperature being indicated by the changes in the fauna.

H. S. W.

Preliminary Report on the Geology of the Arbuckle and Wichita Mountains, in Indian Territory and Oklahoma. By JOSEPH A. TAFF. With an Appendix on Reported Ore Deposits of the Wichita Mountains, by H. FOSTER BAIN. (Professional Paper No. 31, U. S. Geological Survey.)

This paper treats of the geology and physiography of the mountains named in the title. In both mountain regions there is a core of pre-Cambrian igneous rock. These rocks are much the same in both regions. The principal varieties in the Arbuckle Mountains are granite, quartz-monzonite, aplite, granite-porphyry, and diabase. In the Wichita Mountains gabbro is present, besides most of the above.

The lowest sedimentary rocks of the Arbuckle Mountain region are referred to the Middle Cambrian, and the Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Permian, and Cretaceous systems are all represented. The successive formations are conformable up to the top of the Mississippian. There are unconformities between the Mississippian and the Pennsylvanian, between the Pennsylvanian and the Permian, and between the Lower and Upper Cretaceous. The rocks have been considerably deformed and displaced by folding and faulting.

In the Wichita Mountains the oldest sedimentary rocks are likewise referred to the Middle Cambrian. The other systems represented are the Ordovician and the Permian. The intervening Silurian, Devonian, and Carboniferous beds are supposed to be buried by the Red Beds. The structure of the Wichita Mountains is comparable to that of the Arbuckle Mountains; that is, the beds are deformed both by folding and faulting.

The physical history of the region is outlined as follows: The mid-Carboniferous (Mississippian?) rocks were uplifted and folded, resulting

in mountain conditions; but before the end of the Carboniferous (Pennsylvanian?) these mountains were worn down to moderate relief, and before the Cretaceous they were reduced to a peneplain. The earliest peneplain represented in the region is, therefore, of pre-Cretaceous age.

There is a lower peneplain, partially developed, probably of Tertiary age, which cuts the Cretaceous as well as older rocks, and its surface is 100 to 400 feet below that of the Cretaceous peneplain. A still later cycle of erosion has been begun, and the valleys are now developing new plains 200 feet or so below the Tertiary peneplain.

In the Wichita Mountains, there is nothing to indicate the date of the deformation more closely than that it was somewhere between the Ordovician and Permian; but, in view of the similarity of the structure and of the stratigraphy in the two mountain systems, it is regarded as probable that the deformation in the Wichita Mountains occurred at about the same time as that of the Arbuckle Mountains.

With reference to the reported ore deposits in the Wichita Mountains, an elaborate series of tests of materials collected by Dr. Bain shows nothing of economic importance.

R. D. S.

"On the Evolution of the Proboscidea," *Philosophical Transactions*, London (B), Vol. CXCVI, pp. 99-118.

"The Barypoda, a New Order of Ungulate Mammals," *Geological Magazine*, October, 1904, p. 481.

Of the numerous discoveries of Eocene vertebrates from Africa within the past few years none are of more interest than certain forms referred to the Proboscidea by Dr. Andrews, of the British Museum. He has shown very clearly several of the early stages in the evolution of these animals from small-skulled animals with an almost typical eutherian dentition, the first premolar only being wanting, and the second incisor, the tusk of the elephant only moderately developed and not at all porrected. Hitherto the earliest of the Proboscidea known are from the lowest Miocene of France. the order reaching America in the upper Miocene times. That Africa was the original home of this order of ungulates now seems assured.

Another paper of interest by the same author is that in which he defines a new order of ungulates from the Eocene of Africa, which he has called the Barypoda, a group somewhat intermediate between the Amblypoda (Dinocerata) and the Proboscidea.

S. W. W.